

PATENT SPECIFICATION

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COMPLETE SPECIFICATION.

Process for the Manufacture of New Depolymerisation Products from Carbohydrates of High Molecular Weight.

I, WILFRED CARPMAEL, British subject, of 24, Southampton Buildings, London, W.C. 2, do hereby declare the nature of this invention (which has been communicated to me by I. G. Farbenindustrie Aktiengesellschaft, a company organised under the laws of Germany, of Frankfurt-on-Main, Germany) and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The present invention concerns the manufacture of new depolymerisation or degradation products of carbohydrates of high molecular weight.

A process for the manufacture of new depolymerisation products of carbohydrates of high molecular weight, as, for example, various types of starches and celluloses, consists, according to this invention, in treating a carbohydrate with ethylene glycol or monochlorhydrine or mixtures thereof until the required degree of depolymerisation or degradation is reached.

References occur in literature relating to methods of depolymerisation of carbohydrates of high molecular weight. Thus for example it is known that the amylopectin of starch can be degraded to trihexosan by heating with glycerine to 200 to 210° C. (H. Pringsheim and K. Wolfsohn, Ber. 57. 887). Likewise lechinin is degraded to lichosan in a similar manner (H. Pringheim, W. Knoll and E. Kasten, Ber. 58. 2135).

The above mentioned process involves, however, the great disadvantage, that the glycerine is only incompletely removed from the reaction mixture by distillation or alternatively it must be extracted with alcohol, which renders the technical manufacture considerably more expensive. Moreover, the new compounds hereinafter described are not obtained thereby.

The present invention obviates this drawback by effecting the depolymerisation instead of in glycerine in ethylene glycol or in monochlorhydrine or in mixtures thereof. In carrying out the improved process, the carbohydrates to be degraded are boiled under reflux until

the required degree of degradation or depolymerisation is reached. In particular the use of monochlorhydrine causes the degradation of starch into products, which no longer colour iodine in a fraction of the time required in comparison with the degradation in the presence of glycerine, which considering the relatively high temperature of about 200° C. employed in the technical manufacture of similar products constitutes a considerable economy.

A further and important advantage consists in the fact that on the termination of the reaction the depolymerisation agent can be completely removed by distillation in vacuo at comparatively low temperatures, whereby the further working up and purification of the products of depolymerisation is considerably simplified and cheapened.

The superiority of monochlorhydrine especially compared with glycerine as a depolymerisation agent is clearly illustrated by the fact that monochlorhydrine completely dissolves cellulose, which has not been previously treated in any way, in a short time. In this case also, as in the case of starch, products are obtained, which are soluble in alcohol and water, which no longer exert a reducing action and which on hydrolysis with acids yield sugar.

Attempts at a corresponding degradation of cellulose by means of glycerine have hitherto been unsuccessful (Ber. 58. 2139).

The following examples will illustrate the principles underlying my invention, which is, of course, not restricted thereby:—

EXAMPLE 1.

500 parts by weight of ethylene glycol are heated to boiling and 100 parts by weight of starch are dissolved therein with stirring. After 2½ hours the reaction mixture has ceased to give a colour reaction with iodine. The glycol is distilled off in a vacuum of 8 mm. at 88° C. The remaining residue is easily soluble in alcohol and has the appearance of a clear syrup, which possesses a sweet taste. The product is new.

[Price 1/-]

EXAMPLE 2.

500 parts by weight of glycol are boiled for 15 minutes with 100 parts by weight of starch. After the addition of 5 parts by weight of monochlorhydrine the iodine reaction becomes negative, even after 5 minutes. The heating is continued for 15 minutes after the addition of monochlorhydrine. The further working up is effected as described in Example 1. The product is new.

EXAMPLE 3.

100 parts by weight of monochlorhydrine are heated to about 180° C. and 10 parts by weight of paper pulp or cotton are introduced. 85% of the cellulose used is dissolved even when heating for 1 to 1½ hours. The further working up is effected as described in Example 1. The product is new.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. Process for the manufacture of new products of depolymerisation or degrada-

tion from carbohydrates of high molecular weight, as, for example, various types of starch and cellulose, in which a carbohydrate is treated with ethylene glycol or monochlorhydrine or mixtures thereof until the required degree of degradation is obtained.

2. A process as claimed in Claim 1, in which the ethylene glycol or monochlorhydrine or mixtures thereof are heated to boiling.

3. Process for the manufacture of new products of depolymerisation or degradation from carbohydrates of high molecular weight, substantially as described with reference to the examples.

4. The new products of depolymerisation or degradation of carbohydrates of high molecular weight whenever prepared or produced by a process claimed in any of the preceding claims, or by their obvious chemical equivalents.

Dated this 15th day of February, 1927.

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